## Application of Triploidy to an Emergent Oyster Culture Industry on Florida's West Coast: Results of Growers' Trials

Carter Cyr, Reggie Markham, and Leslie Sturmer

University of Florida / IFAS Florida Sea Grant Shellfish Aquaculture Extension Cedar Key, FL







### Apalachicola Bay Oyster Situation Report

### Oyster Culture on Florida's West Coast: An Emergent Industry

Commissioner Putnam, Cabinet Approve New Aquaculture Leases

Expansion of Water Column Leases Brings Opportunity to Apalachicola Bay, Other Areas of the State

Oct 10, 2013

 $\label{eq:tables} \begin{array}{l} \textbf{Tallahassee, FL} = Commissioner of Agriculture Adam H. Putnam and the Florida Cabinet today voted unanimously to approve additional aquaculture leases in several parts of the state, primarily in Apalachicola Bay. \end{array}$ 



### RATIONAL

- Fishery failure in Apalachicola Bay, 2012
- Water column leases approved, 2013
- WEI certification program, 2014
- Infrastructure provided by hard clam aquaculture industry

## Oyster Culture on Florida's West Coast: An Emergent Industry

### STATUS



- 76 clam (bottom) leases modified for water column use
- 64 new oyster culture leases (128 acres)
- 106 certified oyster growers
- No production statistics



### Application of Triploidy to an Emergent Oyster Culture Industry on Florida's West Coast

Project demonstrates and evaluates an oyster breeding process under local conditions



OBJECTIVES are two fold:

- Document production performance, assess health, and evaluate quality of diploid (2N) and triploid (3N) oysters
- 2) Quantify effects of different culture methods and seasonal harvests

Funded by:



## GROWER TRIALS

- Ten growers in 5 counties
  - Pine Island (PI), Lee County
  - Charlotte Harbor (CH), Charlotte County
  - Cedar Key (CK), Levy County
  - Oyster Bay (OB), Wakulla County
  - Alligator Harbor (AH), Franklin County
- Two seasonal trials
  - Winter conditions
  - Summer conditions





### GROWER **TRIALS** Gear used Bottom cages o CH, PI, CK-1 Floating bags o CK-2,3,4 o AH-1,2 Adjustable longlines o OB-1,2 Floating cages

**o** OB-3

### **SEED PRODUCTION**

### SPAWNS

- Trial 1: April 2016
  - 3N: FL west coast 2N $\stackrel{\bigcirc}{=}$  X LSU 4N $\stackrel{\checkmark}{\_}$
  - 2N: FL west coast stocks, half siblings
- Trial 2: September/October 2016
  - 3N: LSU and AU hatcheries
  - 2N: FL west coast hatchery





### LAND-BASED NURSERY

- Trials 1&2
  - 3N & 2N: Nurse in wellers at commercial facility in Cedar Key

### **SEED DISTRIBUTION**

Grower	Diploid Seed		Triploid Seed		Plant
Trials	#	SH (mm)	#	SH (mm)	Dates
1	2500	24	2500	24	22 Jul-2 Aug 2016
2	2500	21	2500	26	22 Mar-5 Apr 2017









## HARVEST / SAMPLE COLLECTION

- Growers were asked to stock 3-4 "sample" bags/baskets at final density and not to harvest from them
- Sample bags/baskets maintained as others
- After 7-8 months, sample bags/baskets were collected
- Live oysters were counted per bag to estimate survival
- Samples from each bag were measured for growth

Grower Trials	Harvest Dates	Growout Time	Growout "Season"
1	22 Mar-5 Apr 2017	8 months	Winter
2	24 Oct-26 Nov 2017	7-8 months	Summer



## DATA COLLECTION

- In addition, activity sheets provided to growers at start of trials
- Record when oysters are planted and transferred and number and sizes of bags
- Record estimated time for various culture activities (plant, transfer, fouling control, harvest, etc.)



Date Number of Bags/Baskets Pulled				Number of Bags/Baskets Returned					
ente	3N	Mesh Size	2N	Mesh Size	3N	Mesh Size	ZN	Mesh Size	Est. Time
823	Z	19.011	Z	1447.6-				1	
9-21-16	2	14mm	2	1442	5	14pm	4	1.4 DMR	25 minu
4-20-16	Ĩ	14-1-	E.	17 201					
1-2016	5	14	4	14 -	10	14 mm	8	14.000	1 hour
2-7-17	1	14 100 19	2	14***	Z	1410	4	14	10 mights
			_	-	-			-	-
	-		_	-	_	-		-	
	-		_			-	_	-	1
				127					











3

### SHELL SHAPE



Shell Length (SL)



## Shell Width (SW)

Shell Height (SH) Preferred Ratio:

Fan Ratio SL/SH = 2/3 = 0.67



Cup Ratio SW/SH = 1/3 = 0.33







### **TRIAL 1: Survival**

### <u>Winter</u>: Jul/Aug 2016 – Mar/Apr 2017

		Survival (%)		
Location	Gear	Diploid	Triploid	
Cedar Key-1	Bottom Cages	91	89	
Cedar Key-2	Floating Bags	99	98	
Alligator Harbor-1	Floating Bags	99	99	
Alligator Harbor-2	Floating Bags	97	98	







## Charlotte Harbor, Charlotte County













## Cedar Key, Levy County













# Oyster Bay, Wakulla County











OB-1

### **Alligator Harbor, Franklin County**









### **CONDITION INDEX**

- Weight ratio that describes quality of meat or yield ("fatness")
- Relative value, no 'ideal' condition index range







### **TRIAL 2: Condition Index**







## **TRIAL 2: Survival**

### Summer: Mar/Apr 2017 – Oct/Nov 2017

		Survival (%)		
Grower	Gear	Diploid	Triploid	
Cedar Key-3	Floating Bags	68	68	
Cedar Key-4	Floating Bags	70	57	
Oyster Bay-3	Floating Cages	82	85	
Alligator Harbor-1	Floating Bags	67	92	





## **TRIAL 2: Biofouling**

= Fouling Weight / Shell Weight (%)

		Biofouling (%)		
Grower	Grower Gear		Triploid	
Cedar Key-3	Floating Bags	65	37	
Cedar Key-4	Floating Bags	118	47	
Oyster Bay-2	Adjustable Longline	22	33	
Oyster Bay-3	Floating Cages	7	22	
Alligator Harbor-1	Floating Bags	26	9	

#### Cedar Key

#### CK-3 CK

**Floating Bag** 



#### Adjustable Longline

**OB** 



**Floating Bag** 



Floating Cage

### TRIAL 2

### **Alligator Harbor**



**Floating Bag** 

## SUMMARY

Multiple demonstration sites were established at commercial shellfish aquaculture leases on Florida's west coast.

March 2017

## SUMMARY

Production differences related to ploidy type, farm location, gear type, and season were documented.

November 2017

## SUMMARY

Potential advantages of triploidy, such as faster growth, shorter crop times, and year-round quality oyster meat were also documented.

March 2017



Home » Oyster Farming Demonstration Project



#### Oyster Farming Demonstration Project Application of Triploidy to the Emergent Florida West Coast Industry

This project allows for large-scale demonstration and evaluation of an oyster breeding process to local conditions on Florida's west coast by oyster growers. The objectives are two-fold:

- 1. Document production performance, assess health, and evaluate the quality (sensory characteristics) of diploid (2N) and triploid (3N) oysters under commercial conditions, and
- 2. Quantify the effects of different culture methods, salinity regimes, and seasonal harvests.

**SCOPE OF WORK:** Oysters from two ploidy types (triploids – 3N and diploids – 2N) and two seasonal spawns (spring and fall) are being provided to certified growers, who have obtained approval from DACS to culture oysters on their shellfish aquaculture leases. Eleven growers in four west coast counties (Charlotte, Franklin, Levy, and Wakulla) are using a variety of culture systems (floating bags, bottom cages, and adjustable lone lines), which allows for evaluation of site and gear interaction on ploidy type. University of Florida (UF) faculty are also culturing oysters at their research lease off Cedar Key to document growth and survival and evaluate gear types, stocking densities, and antifouling coatings.

### Follow this project by viewing the news blog posted at <u>http://shellfish.ifas.ufl.edu</u>

#### FOLLOW THIS PROJECT BY VIEWING THE NEWS ARTICLES BELOW



#### Seed Provided to Growers in July

July 27, 2018 Single-set triploid cyster seed were produced by crossing Cedar Key stocks with sperm from tetrapioid stocks maintained at Louisiane See Grant's cyster hatchery. <u>Read more</u>



UF Plants Seed in August

September 14, 2016

Tripiold and dipiold cyster stocks were also

Financial Characteristics and Risks

January 2017

Another component of the Oyster Culture

Demonstration Project is to document

with diploid versus triploid cyster

Read more

economic costs and benefits associated

production along the west coast of Florida.

Harvesting UF Field Trials

April 2017

Six months after seed cysters (average 25

mm mesh Vexar bags (October 2016), they

mm in shell height) were stocked into 14

were harvested in April 2017 (12 months

from spawn), Read more

planted by UF at their experimental lease

located within the Dog Island Lease Area

off Cedar Key on August 4.

Read more

#### Hurricanes Impact Oyster Trials

October 7, 2010 After meandering around the Guif of Mexico as a tropical depression, Hurricane Hermine gathered steam and headed streight for the Big Bend coast on September 2. Read more



#### UF Oyster Growout Study Initiated

November 1, 2016 This article summarizes the growth of diploid (2N) and triploid (3N) oysters cultured at the UP experimental lease within the Dog Island Lease Area near Cedar Key. <u>Read more</u>



#### Harvesting Growers' Field Trials

Ten growers in four west coast counties participating in this project received syster seed (2500 of each piology type, 20-22 mm in shell height) during Juty 2011s to grow on their leases. Read more



Consumer Evaluation of Oysters

May 2017 Oysters typically acquire their flavor from their growing environment and are foremently anneed after their banest



#### Sampling UF Field Trials

February 2017 A similar number of oysters provided to project participants were also cultured at the UF experimental lease off Cedar Key so that growth and survival could be documented bimonthly during growout. Read more



#### Next Crop of Seed Distributed

April 2017 To quantify the effects of seasonal harvests on ploidy type, several spawns using tetrapioid oysters held from the spring 2016 spawn were attempted in the fail. Read more



#### New UF Growout Study Initiated

June 2017 The second phase of the demonstration project evaluates the performance of dibioid and tripioid systers planted in early

## ACKNOWLEDGEMENTS

### ALL PARTICIPATING GROWERS

Ray Bauer **Carter Davis** Jon Gill Deborah Keller Bill Lartz Johnny Sheridan Shawn Stephenson **Darryl Taylor Ray Vickery Bobby Witt** 

• FUNDING: NOAA National Sea Grant